

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



# The Timber Resources of NEW JERSEY



*A Report  
on the Forest Survey  
made by the  
U.S. Forest Service*

NORTHEASTERN FOREST EXPERIMENT STATION

1958

FOREST SERVICE • U.S. DEPARTMENT OF AGRICULTURE • UPPER DARBY, PA.

RALPH W. MARQUIS, DIRECTOR

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
LIBRARY



BOOK NUMBER A99.13  
F76N

**T**HIS is a report on the timber resource of New Jersey. It is based on the findings of a forest survey made in 1955-56 by the North-eastern Forest Experiment Station in cooperation with the New Jersey Department of Conservation and Economic Development. The forest survey of New Jersey was part of a nationwide survey being made by the Forest Service, U.S. Department of Agriculture.

This report has two parts. The first part presents a broad picture of the forest situation in New Jersey. This is based on an interpretation of the forest survey findings. The second part contains the technical details and results of the forest survey, for the reader who wants additional information.

# The Timber Resources of NEW JERSEY

by

HENRY H. WEBSTER *and* CARL H. STOLTENBERG

*Northeastern Forest Experiment Station  
Forest Service, U.S. Dept. Agriculture*



---

HENRY H. WEBSTER is a forest economist in the Northeastern Forest Experiment Station's Division of Forest Economics Research, and formerly served as a Forest Survey field crew leader. He was graduated from the State University of New York College of Forestry in 1952, and did his graduate work at the University of Michigan, where he took his Master's degree in forest economics in 1956 and is now candidate for Ph.D.

CARL H. STOLTENBERG is chief of the Northeastern Station's Division of Forest Economics Research. He joined the U.S. Forest Service in 1956, having previously been assistant professor of forest economics at Duke University. He took his Bachelor's and Master's degrees in forestry at the University of California in 1948 and 1949, and his Ph.D. in agricultural economics at the University of Minnesota in 1952.

---

# CONTENTS

## I

People & forests .....	1
Use of the timber resource .....	2
The timber inventory .....	5
The changing scene .....	9
For more useful forests .....	11
Summary .....	18

## II

Forest survey data (statistical tables) .....	19
Definitions of terms .....	31
Forest survey methods .....	38
Major forest types (map) .....	41

# I

## *PEOPLE & FORESTS*

**N**EW JERSEY is a land of both people and forests. The State lies in the densely populated Eastern Seaboard: it has 5¼ million people, including a big spillover from the teeming metropolitan areas of New York. And still the State is heavily forested: forests cover more than 46 percent of its total land area.

New Jersey's forests supply many products and services to their users. To landowners, forests provide revenue from the sale of timber products. To hunters, they are a habitat for game. The artist views them as subject matter for his canvas. These forests produce water for city populations, industrial users, and farmers. They produce pulpwood for the paper manufacturer and sawlogs for the lumber industry. They provide a place of relaxation and recreation for families.

Thus, what a forest is depends on the user. And how productive it is depends as much on point of view as on forest condition.

These multiple values of forests and diverse interests of users make an analysis of New Jersey's forest resource difficult. All those concerned with this resource will never be able to agree on just what a forest is or should be. No single point of view will provide a complete basis for deciding what program of management will be most appropriate for New Jersey's forests. But a well-managed forest resource can provide many benefits at once.

This report will discuss New Jersey's forests in view to timber production, one of the most important ways these forests contribute to the welfare of New Jersey's people.

# USE OF THE TIMBER RESOURCE

NEW JERSEY'S forests have been a source of timber products for 300 years. As early as 1650, iron furnaces and forges, glass and pottery factories, as well as numerous homes, were taking fuel from these forests; sawmills were sawing lumber for new buildings; shingles were being produced from cedar forests in the southern part of the State.

The importance of fuelwood set the pattern for the cutting methods used in New Jersey. Fuelwood can be cut from small trees; therefore fuelwood cutters usually removed almost all of the trees from an area. These heavy cuttings were commonly repeated at intervals of 20 to 40 years, and often were followed by fires. Users seldom concerned themselves with leaving the forests in productive condition. Such heavy cutting and abuse of the forests ultimately contributed to a decrease in the quantity of timber products produced in the State: for example, New Jersey lumber production declined precipitously from the Civil War till the end of the boom in the 1920's (fig. 1).

Over the last 100 years, fuelwood production has dropped sharply as other fuels came into use and iron ore production shifted to other parts of the country. And since 1910 forest fire protection has become steadily more effective. These factors, together with a recent high level of economic activity, have brought about increased production of timber products other than fuelwood. For example, lumber production in 1955 was nearly four times as great as it was in 1932 (fig. 1). However, New Jersey's  $5\frac{1}{4}$  million citizens consume a volume of timber products 20 to 25 times the State's output.

The lumber industry and the pulp and paper industry are the major users of raw wood products from New Jersey's forests--trees and logs. About 150 sawmills and 5 pulp mills obtain a major part of their raw material from the forests of the State. These sawmills annually saw into lumber nearly 17 million board-feet of New Jersey timber. Much of it is used in boat-building, construction of various

kinds, and manufacture of boxes, crates, pallets, and wooden containers.

The pulp mills use roughly 85,000 cords of pulpwood annually. This is used in the manufacture of building, roofing, and insulating materials and other paper products. Lesser New Jersey timber products include furnace poles (used in copper-refining plants), piling, fence posts, rustic fencing and furniture, and charcoal.

In their demands on New Jersey's timber resource, the lumber industry and the paper and pulp industry differ in three major respects. In the first place, the State's lumber industry uses primarily hardwoods: but most pulpwood cut in the State is of softwood species. Hardwoods accounted for nearly 80 percent of the 17 million board feet of timber cut in New Jersey forests for lumber in 1955 (fig. 2). The most common hardwood species used were the oaks, yellow-

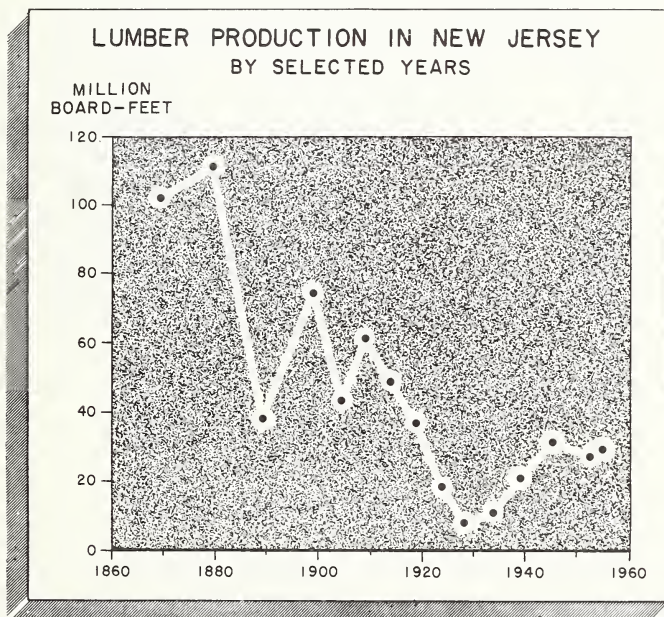


Figure 1.--Total lumber production in New Jersey has risen since the late 1920's, reversing a long downward trend. But New Jersey forests provide only a part of the raw material--about 60 percent.

poplar, and sweetgum. But of the 85,000 cords of pulpwood cut, 75 percent was of softwood species--principally pitch pine, shortleaf pine, and Virginia pine.

These two industries also differ in the way they measure trees. The lumber industry measures trees and logs in board-feet,<sup>1</sup> which results in an estimate of the quantity of lumber the trees or logs will yield. But the pulp industry measures trees and bolts in cords,<sup>1</sup> which is more an estimate of total wood volume than product yield. This difference is a reflection of the relatively great importance of length and straightness in determining the usefulness of logs or trees for lumber as compared with pulp production. A small or crooked tree may have little or no board-foot volume, yet it may have a considerable volume in cords.

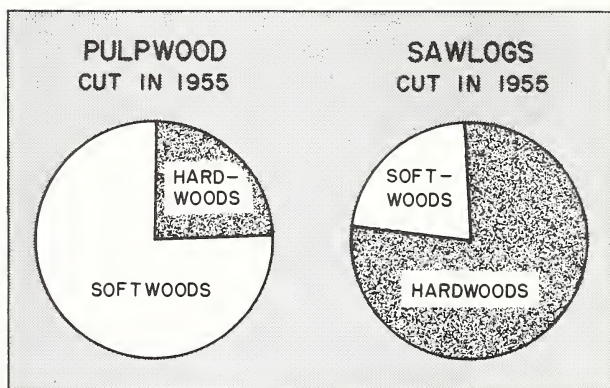


Figure 2.--Most of the pulpwood cut in New Jersey is softwood; but most of the timber cut for the lumber industry is hardwood.

With these differences in mind, one can look at New Jersey's forests as a warehouse of goods for New Jersey's forest industries -a source of raw material for timber users.

<sup>1</sup>A board-foot is lumber: a piece 1 foot long, 1 foot wide, and 1 inch thick--or its equivalent. For example, a 2 by 4 that is 12 feet long contains 8 board-feet. But a cord is raw wood: a stack 8 feet by 4 feet by 4 feet--or its equivalent.

# THE TIMBER INVENTORY

THE present timber inventory is most easily examined from the viewpoints of particular industries. Only the lumber and pulp industries are considered here. Most other forest industries use standards of measurement that are related to those used by one or the other of these two industries.

## *Sawtimber*

Lumber can be produced satisfactorily only from fairly large trees. Hence minimum tree size is one of the first factors to be considered in defining what constitutes sawtimber--that is, standing timber suitable for sawing into lumber. Usually lumber can be sawed from softwood trees 9 inches and larger in diameter and from hardwood trees 11 inches and larger. Lumber can be produced from smaller trees, but this is costly and usually results in low-grade products.

New Jersey's forests contain nearly 3 billion board-feet of sawtimber--enough to build 300,000 frame houses. Most of this sawtimber is in hardwood species. Oaks alone make up more than half of it (fig. 3). Yellow-poplar and sweetgum are lesser but nevertheless important hardwood sawtimber species. By far the greater part of the softwood sawtimber volume is in the yellow pine species--pitch pine, and shortleaf pine.

Several other factors influence the usefulness of sawtimber to the lumber industry. To produce high-value lumber at relatively low cost, available sawtimber volume should be in large high-quality trees, and it should be concentrated on a relatively small area of forest land. How does New Jersey's timber resource measure up to these requirements?

Unfortunately, low quality is characteristic of much of New Jersey's sawtimber. Less than one-fourth of the total

volume is in Log Grades 1 and 2--the desirable high-quality grades (fig. 4). Prevalence of low quality is a result of several factors related to past use of the forests. Because of repeated cuttings and wildfires at fairly short intervals, a large part of the total sawtimber volume is in relatively small trees. This in itself limits timber quality. Furthermore, defective trees are common because past cuttings often removed all trees suitable for production of timber products and left the unsuitable trees standing. Fire damage has also reduced timber quality.

Most of the high-quality timber is found in scattered trees or stands. Stands with more than half of the trees containing Grade 1 or Grade 2 logs occur on only 1/20 of the area occupied by hardwood sawtimber stands

Timber harvesting can be accomplished more economically in stands that have large volumes per acre. Timber prices, species composition, distance from sawmills, and location relative to roads or other transportation facilities also influence the practicality of harvesting sawlogs from particular stands. To simplify matters, however, we assume that harvesting is practical in all stands that have

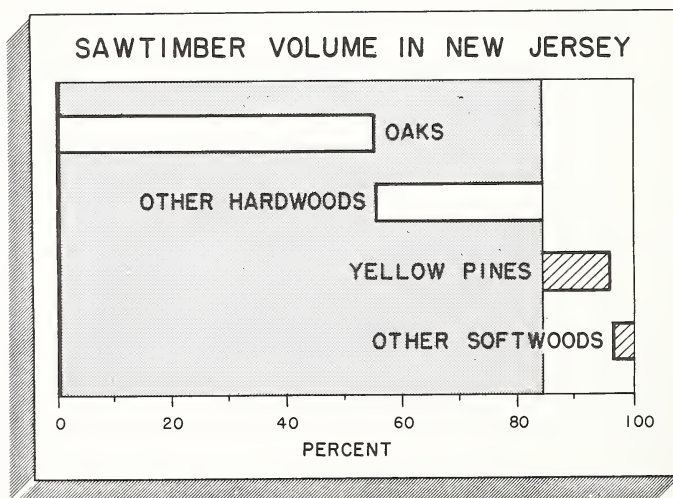


Figure 3.--More than 80 percent of New Jersey's sawtimber volume is in hardwoods. Oaks alone make up over half the volume.

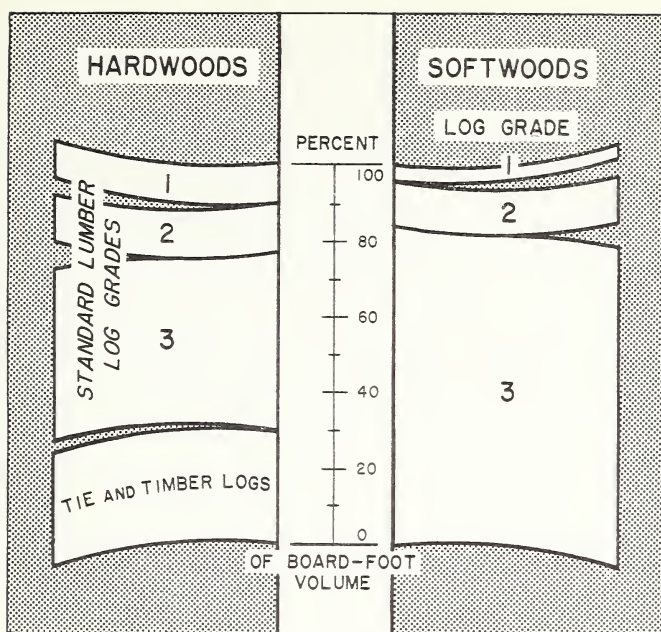


Figure 4.--The quality of the sawtimber in New Jersey is generally poor.

a net volume of 1,500 board-feet or more per acre, and not practical in stands that have less.

By this definition of sawtimber stands, only one-fourth of New Jersey's forest area supports stands immediately useful to the lumber industry as a source of timber. But fortunately almost all of the sawtimber volume is found in such stands. Hence relatively little is lost to the lumber industry in the sense that it occurs in stands having volumes too small for harvesting.

### *Pulpwood*

Pulpwood can be produced satisfactorily from trees and parts of trees that are too small to be sawed into lumber. On the other hand, wood showing any evidence of decay is not acceptable as pulpwood, although limited amounts of decay can be accepted in logs intended for lumber production. Hence the lumber industry and the pulp and paper industry

differ not only in terms of the measurement standards they use: they also differ somewhat in terms of the timber being measured.

In considering pulpwood, we are examining essentially the same timber inventory we considered in terms of sawtimber. For the most part, we will simply be looking at it from a different viewpoint and applying a different measuring stick.

In general, pulpwood can be produced from trees 5 inches and larger in diameter. In trees of this size, more than 14 million cords of wood in New Jersey's forests meet pulpwood specifications. Most of this potential pulpwood is in hardwood species (fig. 5). Yet it is pitch, shortleaf, and Virginia pines that are the major species cut for pulpwood. Thus there is a large volume of hardwood timber physically suitable for pulpwood, but little of it is being used for this purpose.

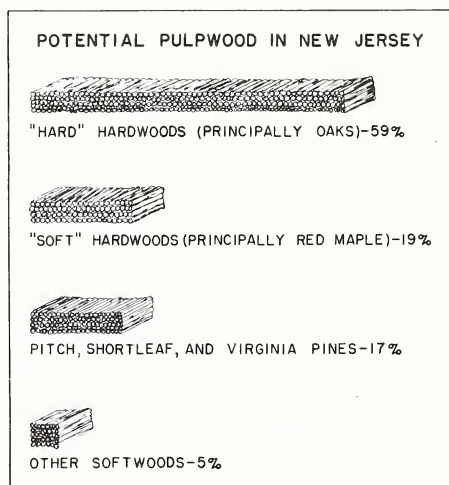


Figure 5.--*Most of the potential pulpwood supply in New Jersey is in the hardwood species.*

Use of hardwood species as pulpwood has expanded greatly in recent years in many parts of the country. The so-called "hard" hardwoods--oaks, hickories, ash, elm, beech,

etc.--have been found to produce high pulp yields once processing problems are overcome. These species, particularly the oaks, make up a large part of New Jersey's potential pulpwood. Hence there is some basis for looking forward to eventual expansion of pulpwood production in the State.

The volume of usable wood per acre affects the practicality of pulpwood harvesting in much the same way it affects the practicality of cutting sawlogs for lumber. Assuming that 5 cords per acre is the minimum volume that can be economically removed, we find that roughly half of New Jersey's forest area supports stands that are operable for pulpwood. These stands contain nearly 90 percent of the wood that meets pulpwood specifications.

## *THE CHANGING SCENE*

THE view we have been taking of New Jersey's forests might be likened to a photograph--all action stopped at a particular point in time. But forests are not static. One of their most important characteristics is the fact that they grow. So let's switch now to a movie camera and see what changes are taking place in New Jersey forests.

The total volume of timber is increasing. In fact, the volume of timber grown in recent years has been nearly four times as great as the volume cut. What effect will this change in the timber resource have upon use of New Jersey timber by forest industry?

The answer depends in part upon many factors not directly related to the forest itself: the general level of economic activity, the volume of residential construction, shippers' preferences for paper cartons as compared with other packaging materials, availability of timber in other parts of the country, and so on. Nevertheless, changes in the timber resource can perhaps give us some rough indication of future trends.

The increasing volume of timber will probably make New Jersey's forests more attractive as a source of raw material. This effect will not be equal for all forest industries. Increases in volume of timber are particularly rapid for knotty, sometimes crooked, material. Furthermore, small trees account for a large part of the increase. This type of timber is more suitable for use as pulpwood than for use in the production of lumber. Hence, for the immediate future at least, changes in the timber resource favor expansion of pulp and paper production more than they favor expansion of lumber production.

However, if the cut in small trees is not expanded, this excess of growth over cut will ultimately lead to a large increase in the volume of timber suitable for lumber production. Many of these small trees are a potential source of higher quality sawtimber than that now found in New Jersey forests.

In any case, a really large expansion of pulp production based on New Jersey timber will probably require a change in the species used. Pulp mills in the State now use primarily the yellow pines, though most of the standing tim-

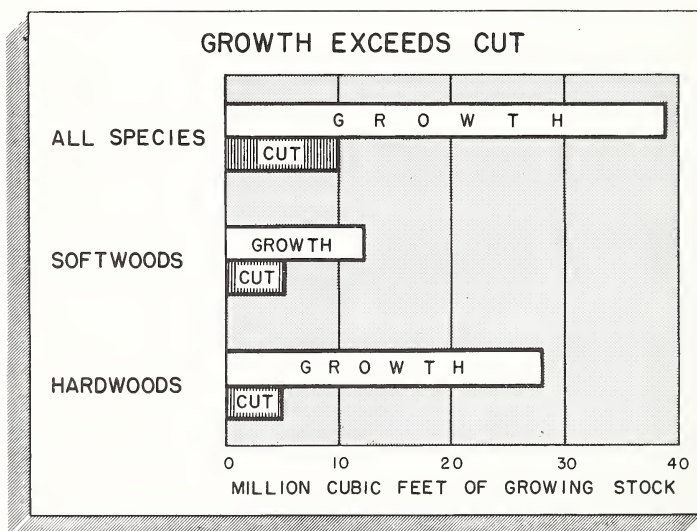


Figure 6.--The total volume of timber in New Jersey is increasing, but most of the increase is in small hardwoods.

ber that meets pulpwood specifications is of hardwood species. And furthermore, the volume of hardwood timber is increasing much more rapidly than the volume of softwood timber (fig. 6).

## FOR MORE USEFUL FORESTS

NEW JERSEY's forests would be more useful if their production of timber products could be increased. Increased timber production would mean more raw material for forest industries. This, in turn, might lead to expanded production, income, and employment in these industries and to additional income for forest land owners.

One might ask: Why increase timber production when more is already being grown than is cut? We have the answer when we recall that much of New Jersey's timber is rather ill suited for industrial use in terms of species, quality, and tree size. If production, income, and employment in the forest industries are to increase, what is needed is more timber that is well adapted to industrial requirements.

Many different measures to this end might be undertaken. Consider briefly these four measures: protection of the timber resource; timber-stand improvement; postponement of harvest cuts in young stands; and harvest cuttings and related treatments.

### *Protection*

The objective of protection is to prevent or reduce losses from destructive agents such as fire, insects, and tree diseases. These losses include destruction of mature timber, hindering of growth, and unfavorable changes in the species composition of damaged stands.

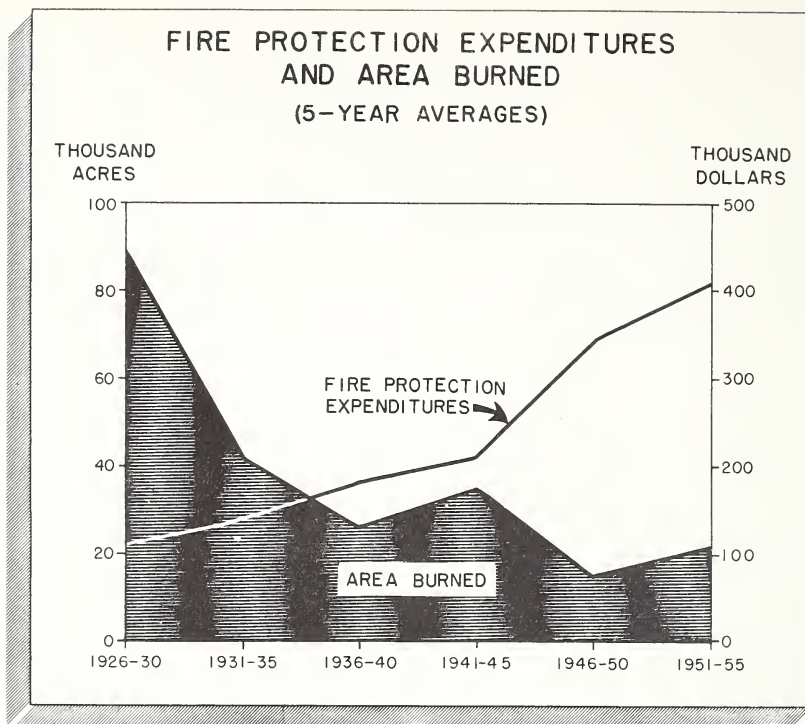


Figure 7.--New Jersey has made good progress in reducing forest fire damage. The State spends more money per acre for fire protection than any other state in the Northeast except Rhode Island.

Wildfires are in a sense the most serious source of loss in New Jersey because such losses are usually preventable. Fire losses are particularly severe in the southern part of the State. In the section known as the Pine Region or Pine Barrens, repeated wildfires have long kept large areas unproductive that could be producing useful stands of yellow pines--the species most used for pulpwood in New Jersey. Nearly half of the area in the yellow pine type, for example, is in stands not now useful for timber products. Severe fires in this region have also encouraged replacement of pine species by lower value oaks and have reduced the area of the extremely valuable Atlantic white-cedar type.

Reduction of these losses would not only enable New Jersey's forests to produce a larger volume of timber useful

for industrial purposes, but would also make the forests more attractive for recreational uses.

Highly flammable forests, periodic droughts, and heavy travel through forested parts of the State make New Jersey, and particularly its Pine Region, a high-fire-hazard area. As a result, New Jersey is already spending proportionally more for forest fire protection than any other northeastern state except Rhode Island. However, reductions in the area of forest land burned show that progress is being made (fig. 7). Every New Jersey citizen can contribute to this progress. By being careful in the woods he can directly help to prevent fires, nearly all of which are started by people.

Forest-land owners can make additional contributions. They can construct and maintain woods roads and firebreaks; and in the Pine Region, with the advice and assistance of State-employed foresters, they can use prescribed or controlled burning to reduce fuels and thus make wildfires easier to control and less destructive.

#### *Timber-Stand Improvement*

Timber-stand improvement includes such measures as removal of cull trees and thinning. These measures are designed to hasten the growth and improve the quality of existing stands.

Cull trees are those that are too limby, too crooked, or too defective otherwise to be converted into timber products. Nearly 20 percent of the total volume of wood in New Jersey's forests is in cull trees. While they contribute little or nothing in the way of usable timber, they nevertheless occupy space in the forest. Removal of these culls could release this space to more useful trees.

Thinning involves cutting some of the less promising trees in crowded young stands. This hastens the natural thinning-out that occurs as forest stands grow older. It provides more growing space for the trees that are left. Thus growth is concentrated on the higher quality trees and on trees of the more desirable species.

## *Postponement of Harvest Cuts in Young Stands*

One consideration in cutting young stands of relatively small trees is the sacrifice of the increase in volume and quality that would have taken place through growth had the cut not been made. The wisdom of making a major cut in a stand can be fully judged only by considering a number of factors such as present timber prices as compared with timber prices expected in the future, the rate of growth expected, and the importance attached to present income in comparison with future income.

Cutting operations in many New Jersey stands show that some owners give little consideration to the growth potential of their young stands. Heavy cuts that remove virtually all usable trees are most common in yellow-pine stands and in white-cedar stands. More than half of the State's pine pulpwood is cut from trees less than 9 inches in diameter. One-third of the white-cedar cut is from trees less than 5 inches in diameter. These trees are being cut just when they are growing most rapidly.

Postponing major cuts in these stands would take advantage of this growth as a means of increasing timber production in the future. Thinning--where applicable--is a way to both cutting some timber now and at the same time increasing future production of high-quality timber.

## *Harvest Cuttings And Related Treatments*

When harvest cuts are made, the methods used greatly affect composition and quality of the new stand that grows up after cutting. Since selection of appropriate methods is a highly technical problem, only a few general observations can be made here.

Trees left standing when a harvest cutting is made directly influence the new stand in several ways. For one thing, they may provide the seed. They also provide shade, which in some cases may protect young trees from overexposure. In other cases, too much shade may interfere with establishment and growth of young trees. The complexities

of selecting appropriate methods for particular stands and the benefits of professional forestry advice are apparent here.

Additional treatments after the harvest cutting are often necessary if a desirable stand is to be established. Species such as the pines and yellow-poplar can often be favored through treatments such as prescribed burning and disking, which expose mineral soil and thus provide a more favorable seedbed. Disposal of logging slash is often an essential measure in white-cedar stands. And, in nearly all stands, control of competing vegetation through cutting or by chemical means will aid in the establishment of desirable young trees.

### *Carrying Out These Measures*

Timber production in New Jersey could be increased through improved protection, timber-stand improvement, postponement of harvest cuttings in young stands, and harvesting practices that help to shape up the new stand. The 30,000 private owners, who hold nearly 90 percent of the forest land in the State, might apply some of these measures directly.

The average citizen of New Jersey, though he owns no timber land and even though he may not know an oak tree from a pine, could also help in carrying out such measures. He could help by understanding and supporting public forestry programs. At the very least, he could help by being careful not to start forest fires.

Public forestry programs help in a number of ways. Public forestry programs in New Jersey are administered through the New Jersey Department of Conservation and Economic Development with certain financial and technical assistance from the Federal Government. These programs have three principal facets: administration of State-owned forest land, protection of State and private forest land, and assistance to private owners of forest land.

Most of the publicly owned forest land in New Jersey is in State ownership. Three-fourths of the State-owned

forest land is organized into State Forests managed by professional foresters; timber production is one of their major management objectives. All measures related to timber production on these forests are directly under State control.

Providing some protection against fire, insects, and diseases is considered to be a public responsibility. Protection programs to this end are carried out by the State on all forest land irrespective of ownership. Some private owners also undertake additional, more intensive protection measures.

Assistance to private owners, the third facet of the State programs, is extremely important for several reasons. In the first place, most of the forest land in the State is in private ownership (fig. 8). Second, many private owners hold forest land primarily for reasons not directly related to timber production. Third, most private holdings are too small to justify employing professional foresters on a full-time basis (fig. 9). Consequently, many forest-land owners lack both interest in timber production and knowledge of timber-production methods.

To stimulate interest among private owners, and to help them manage their woodlands, the Forestry Cooperation

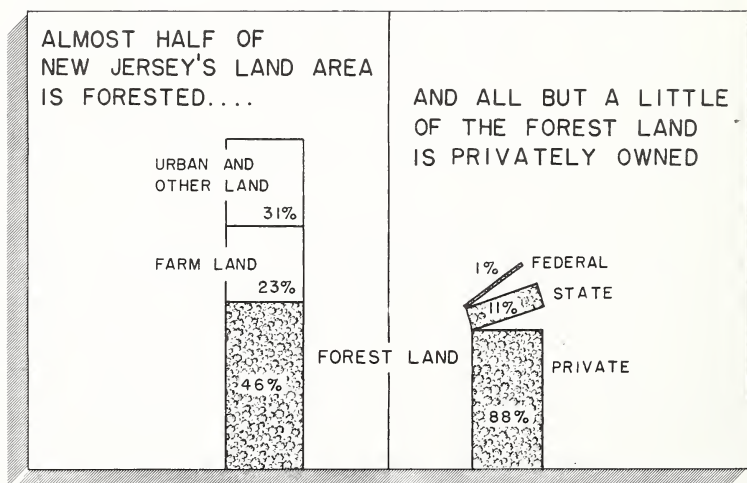


Figure 8.--Nearly 90 percent of the forest land in New Jersey is privately owned.

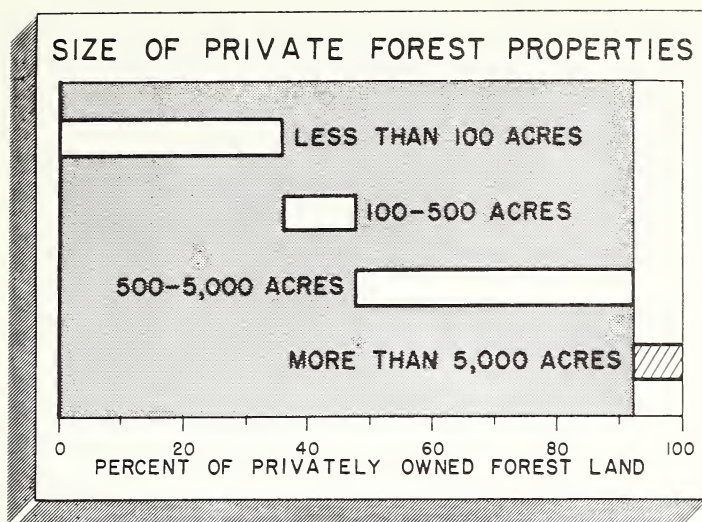


Figure 9.--*Most of the private holdings of forest land are too small to afford intensive forestry.*

Section of The Department of Conservation and Economic Development offers free forestry services to landowners.

When a landowner asks for these services, a State-employed forester goes over his woodland with him and sets up a forest-management plan that suits his particular woodland and best meets his needs. This management plan may include harvest cuttings, tree planting, and stand-improvement practices. This State service is free. State-employed foresters can also arrange for supervision of timber sales and logging operations by private timber agents (whom the landowner pays on a commission basis), to protect the landowner's interests and to make sure that appropriate forest-management practices are followed.

Requests for such services can be made directly to the Forestry Cooperation Section or through County Agricultural Agents, Agricultural Conservation Program office managers, or Soil Conservation Service district supervisors.

The State also carries on an educational program in forestry. Much of this work is done in cooperation with the Agricultural Extension Service.

Another sort of assistance is provided for farmers through the Agricultural Conservation Program. Under this program, the Federal Government, through the U.S. Department of Agriculture, pays part of the cost of certain forestry practices on private land. A woodland owner can also get professional help by employing the services of a consulting forester.

## SUMMARY

NEW JERSEY's forests are useful in many different ways. They provide timber, water, game, and outdoor recreation. They provide raw material for industries, the most important of which are the lumber industry and the pulp and paper industry.

Timber-products output has increased in recent years. Nevertheless, only a part of the timber available is now being used. Hence it appears that there are opportunities for further expansion of forest industries.

Unfortunately, much of New Jersey's timber is not well-suited to industrial requirements. It would be more useful were more of it in large trees, of better quality, and in high value species.

Production of timber well-adapted to industrial requirements could be increased in several ways. Some of the measures most appropriate in New Jersey are improved forest fire protection; timber-stand improvement measures such as removal of cull trees and thinning; postponement of harvest cuts in young stands; and more skillful application of harvest cuttings and related treatments.

Every New Jersey citizen could have a part in applying these measures. The State's 30,000 owners of private forest land could apply them directly. All citizens could help by preventing wildfires and by supporting public forestry programs.

# II

## FOREST SURVEY DATA

**T**ABLES of statistical data, compiled from the findings of the forest survey of New Jersey, follow. These data are grouped in the following manner:

	<i>Page</i>
Timber growth and cut .....	20
(Tables 1 to 6)	
Timber inventory volume .....	23
(Tables 7 to 15)	
Area, condition, and ownership of forest land ...	27
(Tables 16 to 21)	

### NATIONAL STANDARD TABLES

To facilitate compilation of forest-survey data for any group of states, region, or the Nation as a whole, a set of 10 standard tables is ordinarily presented in U.S. Forest Service forest-survey statistical reports. In this report these data are located as follows:

	<i>Table</i>	<i>Page</i>
Land area, by major classes of land .....	16	28
Commercial forest land area, by ownership and stand-size classes .....	20	30
Area of commercial forest land, by major forest types .....	17	28
Net volume of live sawtimber and growing stock on commercial forest land and area occupied, by stand-size class .....	10	25
Net volume of live sawtimber and growing stock on commercial forest land, by ownership class .....	11	25
Net volume of live sawtimber and growing stock on commercial forest land, by species .....	7	23
Net volume of live sawtimber on commercial forest land, by diameter-class groups and species .....	12	26
Net volume of all timber on commercial forest land, by class of material and species group .....	13	26
Net annual growth, annual mortality, and annual cut of live sawtimber and grow- ing stock on commercial forest land, by species group .....	3	21
Output of timber products and annual cut of live sawtimber and growing stock .....	1	20

Table 1.--Output of timber products and annual cut of live sawtimber and growing stock, New Jersey, 1955

Product	Output of timber products					Annual cut of sawtimber				Annual cut of growing stock		
	Volume in standard units <sup>1</sup>		Roundwood volume			Soft-woods	Hard-woods	All species	M board-feet	Soft-woods	Hard-woods	All species
	Units	Number	Soft-woods	Hard-woods	All species							
Sawlogs Veneer logs & bolts Pulpwood Piling Fence posts Round mine timbers Other industrial timber products <sup>5</sup>  All industrial timber products Fuelwood  All timber products	Thousand board-feet <sup>2</sup>	17,206	1,374	1,733	3,107	4,656	8,880	13,536	1,365	1,803	3,168	
	Thousand board-feet <sup>2</sup>	1,174	--	190	190	--	1,201	1,201	--	249	249	
	Standard cords <sup>3,4</sup>	84,820	5,163	1,606	6,769	2,752	2,610	5,362	2,958	1,277	4,235	
	Thousand linear feet	172	43	61	104	219	216	435	54	67	121	
	Thousand pieces	975	965	10	975	114	13	127	448	10	458	
	Thousand cubic feet	57	--	60	60	--	50	50	--	60	60	
	Thousand cubic feet <sup>4</sup>	1,546	872	627	1,499	111	2,247	2,358	328	633	961	
	--	--	8,417	4,287	12,704	7,852	15,217	23,069	5,153	4,099	9,252	
	Standard cords <sup>6</sup>	66,374	23	2,793	2,816	19	2,768	2,787	9	1,211	1,220	
	--	--	8,440	7,080	15,520	7,871	17,985	25,856	5,162	5,310	10,472	

<sup>1</sup>From both growing stock and other miscellaneous sources.

<sup>2</sup>International 1/4-inch rule.

<sup>3</sup>Standard cord, rough wood basis.

<sup>4</sup>No material from mill residues used during 1955.

<sup>5</sup>Includes chemical wood, excelsior, furnace poles, berry and seed flats, rustic and snow fencing, lath, beam poles, shingles, and bevel-edge siding.

<sup>6</sup>Does not include 296,000 cubic feet of softwood mill residues and 2,198,000 cubic feet of hardwood mill residues.

Table 2.--Sawlogs cut from New Jersey forests,  
by species, 1955

Species	Volume Cut
	<u>Thousand</u> <u>bd.-ft.</u>
SOFTWOODS	
Pitch, shortleaf, and Virginia pines	2,196
Atlantic white-cedar	1,362
Other softwoods	220
All softwoods	3,778
HARDWOODS	
Oaks	7,557
Yellow-poplar	1,098
Sweetgum	549
Other hardwoods	4,224
All hardwoods	13,428
All species	17,206

Table 3.--Net annual growth, annual mortality, and annual cut of live sawtimber  
and growing stock on commercial forest land, by species group, New Jersey, 1955

Item	Sawtimber			Growing stock		
	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species
	<u>Million</u> <u>bd.-ft.</u>	<u>Million</u> <u>bd.-ft.</u>	<u>Million</u> <u>bd.-ft.</u>	<u>Million</u> <u>cu.ft.</u>	<u>Million</u> <u>cu.ft.</u>	<u>Million</u> <u>cu.ft.</u>
Net annual growth	22	80	102	11	28	39
Annual mortality	2	16	18	3	* 10	13
Annual cut						
Timber products	8	17	25	5	5	10
Logging residues	(*)	1	1	(*)	(*)	(*)
Total	8	18	26	5	5	10

\* Less than 500,000.

Table 4.--Net annual growth and annual cut of growing stock  
on commercial forest land, by class of timber,  
New Jersey, 1955

Class of timber	Net annual growth	Annual cut
	<u>Million</u> <u>cu.ft.</u>	<u>Million</u> <u>cu.ft.</u>
Poletimber	13.5	4.6
Sawtimber	25.3	5.9

Table 5.--Components of net annual growth of growing stock on commercial forest land  
by species group, New Jersey, 1955

Item	Softwoods	Hardwoods	All species
	<u>Thousand</u> <u>cu.ft.</u>	<u>Thousand</u> <u>cu.ft.</u>	<u>Thousand</u> <u>cu.ft.</u>
Gross growth on initial growing stock	7,400	29,700	37,100
Ingrowth--saplings that became poletimber trees during 1956	6,500	8,300	14,800
Gross growth	13,900	38,000	51,900
Annual mortality	2,900	10,200	13,100
Net annual growth of growing stock	11,000	27,800	38,000

Table 6.--Components of net annual growth of sawtimber on commercial forest land  
by species group, New Jersey, 1956

Item	Softwoods	Hardwoods	All species
	<u>Thousand</u> <u>bd-ft.</u>	<u>Thousand</u> <u>bd-ft.</u>	<u>Thousand</u> <u>bd-ft.</u>
Gross growth on initial sawtimber inventory	7,400	53,800	61,200
Ingrowth--poletimber trees that became sawtimber trees during 1956	16,300	42,900	59,200
Gross growth	23,700	96,700	120,400
Annual mortality	2,200	16,200	18,400
Net annual growth of sawtimber	21,500	80,500	102,000

Table 7.--Net volume of live sawtimber and growing stock  
on commercial forest land, by species,  
New Jersey, 1956

Species	Sawtimber	Growing stock
	<u>Million</u> <u>bd-ft.</u>	<u>Million</u> <u>cu.ft.</u>
SOFTWOODS:		
Pitch pine	222	132
Other yellow pines	142	84
White pine	11	15
Hemlock	51	16
Atlantic white-cedar	30	18
Other softwoods	4	2
All softwoods	460	267
HARDWOODS:		
Black oak	508	165
Northern red oak	411	133
Other red oaks	133	43
All red oaks	1,052	341
White oak ( <i>Q. alba</i> )	454	149
Other white oaks	130	98
All white oaks	584	247
Yellow-poplar	194	53
Sweetgum	152	54
Ash	80	36
Blackgum	62	26
Hickory	59	25
Beech	29	11
Red maple	151	96
Other hardwoods	131	87
All hardwoods	2,494	976
All species	*2,954	**1,243

\*Standard error = 8.9 percent.

\*\*Standard error = 5.5 percent.

Table 8.--Quality of hardwood sawtimber on commercial forest land,  
by species groups, New Jersey, 1956

Species group	Saw- timber volume	Proportion of volume in various log grades			
		Standard-lumber logs			Tie-and- timber logs
		Grade 1	Grade 2	Grade 3	
	<u>Million bd-ft.</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Red oaks	1,052	8	9	48	35
White oaks	580	12	19	49	20
Yellow-poplar	194	14	28	39	19
Sweetgum	152	20	15	35	30
Other hardwoods	516	9	9	49	33
All hardwoods	2,493	10	13	47	30

Table 9.--Quality of pine sawtimber on commercial forest  
land, New Jersey, 1956

Quality	Sawtimber volume (Basis: 376 million board-feet)
	<u>Percent</u>
Log Grade 1	3
Log Grade 2	12
Log Grade 3	85

Table 10.--Net volume of live sawtimber and growing stock  
on commercial forest land, by stand-size class,  
New Jersey, 1956

Stand-size class	Area	Sawtimber volume	Growing stock
	<u>Thousand acres</u>	<u>Million bd-ft.</u>	<u>Million cu.ft.</u>
Sawtimber stands:			
More than 5,000 board-feet per acre	145	1,267	320
1,500 to 5,000 board-feet per acre	390	1,197	434
All sawtimber stands	535	2,464	754
Poletimber stands	720	443	426
Seedling-and-sapling stands	724	41	59
Nonstocked and other areas not elsewhere classified	141	6	4
All stands	*2,120	**2,954	***1,243

\* Standard error = 1.7 percent.

\*\* Standard error = 8.9 percent.

\*\*\* Standard error = 5.5 percent.

Table 11.--Net volume of live sawtimber and growing stock  
on commercial forest land by ownership class,  
New Jersey, 1956

Ownership class	Sawtimber		Growing stock	
	<u>Million bd-ft.</u>	<u>Percent</u>	<u>Million cu.ft.</u>	<u>Percent</u>
Federal	4	(*)	4	(*)
State	107	4	73	6
Private:				
Farm	384	13	185	15
Other private	2,459	83	981	79
All private ownerships	2,843	96	1,166	94
All ownerships	**2,954	100	1,243	100

\* Less than ½ percent.

\*\* Standard error = 8.9 percent.

Table 12.--Net volume of live sawtimber on commercial forest land,  
by diameter-class groups and species, New Jersey, 1956

(In millions of board-feet)

Species	Diameter-class group (in inches)						Total
	10	12	14	16	18	20+	
Yellow pines	141	119	55	45	9	6	375
Other softwoods	21	22	10	13	14	5	85
All softwoods	162	141	65	58	23	11	460
White oaks	--	114	136	78	59	193	580
Northern red oak	--	101	109	71	32	98	411
Black oak	--	59	84	102	100	163	508
Other red oaks	--	12	28	32	4	57	133
Sweetgum	--	29	13	33	22	55	152
Yellow-poplar	--	17	23	58	52	44	194
Beech	--	14	7	8	--	--	29
Other hardwoods	--	141	126	64	44	112	487
All hardwoods	--	487	526	446	313	722	2,494
All species	162	628	591	504	336	733	*2,954

\*Standard error = 8.9 percent.

Table 13.--Net volume of all timber on commercial forest land,  
by class of material and species group, New Jersey, 1956

(In millions of cubic feet)

Class of material	All species	Softwoods	Hardwoods
GROWING STOCK:			
Sawtimber trees			
Sawlog portion	627	122	505
Upper-stem portion	106	16	90
Total	733	138	595
Poletimber trees	510	129	381
Total growing stock	1,243	267	976
OTHER MATERIAL:*			
Sound cull trees	44	5	39
Rotten cull trees	36	3	33
Hardwood limbs	172	--	172
Total other material	252	8	244
Total, all timber	1,495	275	1,220

\*The item "salvable dead trees" is not included here because there is only negligible volume of this class of material in New Jersey.

Table 14.--Net volume suitable for pulpwood  
on commercial forest-land, by species,  
New Jersey, 1956

Species	Pulpwood volume
	<u>Thousand</u> <u>cords</u>
SOFTWOODS:	
Pitch pine	1,530
Other yellow pines	870
Atlantic white-cedar	210
Hemlock	190
White pine	170
Other softwoods	140
All softwoods	3,110
SOFT HARDWOODS:	
Red maple	1,080
Sweetgum	620
Yellow-poplar	600
Black tupelo	300
Other soft hardwoods	130
All soft hardwoods	2,730
HARD HARDWOODS:	
Red oaks	3,850
White oaks	2,780
Ash	410
Hickory	280
Sweet birch	410
Other hard hardwoods	620
All hard hardwoods	8,350
All species	14,190

Table 15.--Area occupied and volume suitable for pulpwood,  
by pulpwood volume class, New Jersey, 1956

Pulpwood class	Area		Volume	
	<u>Thousand</u> <u>acres</u>	<u>Percent</u>	<u>Thousand</u> <u>cords</u>	<u>Percent</u>
Less than 5 cords per acre	1,120	53	1,640	12
5 to 15 cords per acre	690	32	6,010	42
More than 15 cords per acre	310	15	6,540	46
All pulpwood classes	2,120	100	14,190	100

Table 16.--Land area of New Jersey, by major classes  
of land, 1956

Class of land	Area	
	Thousand acres	Percent
Forest:		
Commercial	2,120	44
Noncommercial:		
Productive but reserved	67	1
Unproductive	42	1
All forest land	2,229	46
Nonforest	2,585	54
All land	4,814	100

Table 17.--Area of commercial forest land by major forest  
types, New Jersey, 1956

Forest type	Area
	Thousand acres
Yellow-pine:	
Pitch, shortleaf, and Virginia pines	534
Hard pine-oak	132
	666
Atlantic white-cedar	46
White pine-hemlock	17
Other softwoods:	
Eastern red cedar	66
Spruce	9
	75
Oak-hard pine	129
Oak:	
Red oak	398
White oak	200
Chestnut oak	120
Yellow-poplar-oak	36
Cove hardwoods	18
	772
Swamp hardwoods:	
Red maple	109
Ash-elm-maple	34
Red maple-black tupelo-sweetbay	48
Bottomland hardwoods	158
River birch-sycamore	7
	356
Sugar maple-beech-yellow birch	38
Aspen-gray birch	21
All types	*2,120

\*Standard error = 1.7 percent.

Table 18.--Commercial forest-land area by forest-type group and stand-size class, New Jersey, 1956

Forest-type group	Total area	Proportions of area by stand-size classes		
		Sawtimber stands	Poletimber stands	Seedling-and-sapling stands and other areas
	<u>Thousand acres</u>	<u>Per-cent</u>	<u>Per-cent</u>	<u>Per-cent</u>
Red oaks	398	48	35	17
White oaks	200	39	33	28
Bottomland hardwoods	158	48	31	21
Other hardwood types	560	19	31	50
All hardwood types	1,316	35	32	33
Pitch, shortleaf, and Virginia pines	534	11	41	48
Other softwood types	270	7	29	64
All softwood types	804	10	36	54
All types	* 2,120	25	34	41

\*Standard error = 1.7 percent.

Table 19.--Stocking on commercial forest land by stand-size class and stocking class, New Jersey, 1956

Stand-size class	Stocking (percent)		
	40 or more	10 to 39	Less than 10
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Sawtimber stands	98	2	--
Poletimber stands	99	1	--
Seedling-and-sapling stands	97	3	--
Nonstocked areas	--	--	100
All commercial forest land	91	2	7

Table 20.--Commercial forest-land area, by ownership  
and stand-size classes, New Jersey, 1956

(In thousands of acres)

Ownership class	All owner- ship classes	Saw- timber stands	Pole- timber stands	Seedling- and- sapling stands	Non- stocked areas
<b>Public:</b>					
Federal	17	1	7	8	1
State	237	18	117	92	10
Total public	254	19	124	100	11
<b>Private:</b>					
Farm	322	62	157	63	40
Forest industry and other private	1,544	454	439	561	90
Total private	1,866	516	596	624	130
All ownerships	2,120	535	720	724	141

Table 21.--Number of private owners and total acreage  
of privately owned commercial forest land, by  
size-of-holding classes, New Jersey, 1956

Size-class of holding (acres)	Owners	Area
	No.	Thousand acres
Under 100	26,880	672
100 to 500	1,370	232
500 to 5,000	1,030	805
5,000 and over	6	157
All private holdings	29,286	1,866

# DEFINITIONS OF TERMS

## MEASURES OF FOREST AREA

*Forest-land area.*--Includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and that has not been developed for other use; and (c) afforested areas (forest tracts of less than 1 acre and isolated strips of timber less than 120 feet wide are excluded).

*Commercial forest-land area.*--Forest land that is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber); (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

*Noncommercial forest-land area.*--Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

## FOREST COVER TYPES

Forest cover types are classified according to the predominant species or species group, as indicated by cubic-foot volume for sawtimber and pole timber stands, and number of trees for seedling-and-sapling stands. All local forest types are keyed to the following eight major types:

*White-red pine.*--Forests in which 50 percent or more of the stand is eastern white pine or red pine, singly or in combination. In New Jersey it includes the white pine and hemlock types. (Red pine occurs in New Jersey in plantations only.)

*Spruce-fir.*--Forests in which 50 percent or more of the stand is in spruce and fir. In New Jersey it includes only the spruce type. (Spruce occurs in New Jersey in plantations only.)

*Loblolly-shortleaf pine.*--Forests in which 50 percent or more of the stand is loblolly pine; shortleaf pine, or other yellow pine species. In New Jersey it is made up of the pitch, shortleaf and Virginia pines type and the hard pine-oak type. (In New Jersey loblolly pine is found mostly in plantations.)

*Oak-pine type.*--Forests in which 50 percent or more of the stand is oak species in mixture with pine species. In New Jersey it includes only the oak-hard pine type. Pitch pine, shortleaf pine, and Virginia pine make up the pine component of this type.

*Oak-hickory.*--Forests in which 50 percent or more of the stand is in oak species. In New Jersey it includes the red oak, white oak, chestnut oak, yellow-poplar-oak, and cove hardwoods types. For national summaries, the eastern redcedar type is also included.

*Maple-beech-birch.*--Forests in which 50 percent or more of the stand is sugar maple, beech, or yellow birch, singly or in combination. In New Jersey it includes only the sugar maple-beech-yellow birch type.

*Elm-ash-cottonwood* (termed swamp hardwoods in this report).--Forests in which 50 percent or more of the stand is in red maple, elm, ash, or associated species, singly or in combination. In New Jersey it includes the red maple, ash-elm-maple, red maple-black tupelo-sweet-bay, bottomland hardwoods, and river birch-sycamore types. For national summaries, the Atlantic white-cedar type is also included.

*Aspen-birch.*--Forests in which 50 percent or more of the stand is aspen, paper birch, or gray birch, singly or in combination. In New Jersey it includes only the aspen-gray birch type, which in turn is limited principally to gray birch.

## CLASSES OF TIMBER

*Sawtimber trees.*--Trees of commercial species that contain at least one merchantable sawlog as defined by regional practice and that are of the following minimum diameters at breast height: softwoods 9.0 inches and hardwoods 11.0 inches. (A merchantable sawlog is a portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification.)

*Poletimber trees.*--Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height: softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. (Such trees will usually become sawtimber trees if left to grow.)

*Seedling-and-sapling trees.*--Live trees of commercial species less than 5.0 inches in diameter at breast height and of good form and vigor.

*Cull trees.*--Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect or rot, or because they are of undesirable species.

*Hardwood limbs.*--Limbs of hardwood sawtimber trees and sawtimber-size cull hardwood trees to a minimum diameter of 4.0 inches inside bark.

## STAND-SIZE CLASSES

*Sawtimber stands.*--Stands with sawtimber trees having a minimum net volume per acre of 1,500 board feet, International  $\frac{1}{4}$ -inch rule.

*Poletimber stands.*--Stands failing to meet the sawtimber stand specification, but at least 10 percent stocked with poletimber and larger trees (5.0 inches d.b.h. and larger) and with at least half of the minimum stocking in poletimber trees.

*Seedling-and-sapling stands.*--Stands not qualifying as either sawtimber or poletimber stands, but having at least 10 percent stocking of trees of commercial species, and with at least half the minimum stocking seedling-and-sapling trees.

*Nonstocked and other areas not elsewhere classified.*--Areas that do not qualify as sawtimber, poletimber, or seedling-and-sapling stands.

## MEASURES OF TIMBER VOLUME

*Growing stock.*--Net volume, in cubic feet, of live sawtimber trees and live poletimber trees from stump to a minimum 4-inch top (of central stem) inside bark.

*Live sawtimber volume.*--Net volume in board feet, International  $\frac{1}{4}$ -inch rule, of live sawtimber trees of commercial species.

*Net volume in cubic feet.*--Gross volume in cubic feet, less deductions for rot.

*Standard cord.*--A unit of measure for stacked wood, encompassing 128 cubic feet of wood, bark, and air space. Cord estimates are derived from cubic-foot measurements by applying a factor of 80 cubic feet of wood (without bark) per rough cord.

*Net volume in board feet.*--Gross volume in board feet (log scale, International  $\frac{1}{4}$ -inch rule) less deductions for rot, sweep, and other defects affecting use for lumber.

## LOG GRADES

Log grades used in the survey are outlined in Figures 10, 11, and 12.

## HARDWOOD LUMBER LOGS

GRADE FACTORS *		SPECIFICATIONS					
		Log Grade 1		Log Grade 2		Log Grade 3	
Position in tree		Butts only	Butts & uppers		Butts & uppers		
Minimum diameter (inches)		13-15	16-19	20+	211	12+	
Minimum length (feet)		10+	10+	10+	10+	10-11	
Clear cuttings on each of the 3 best faces	Min. length (feet)	7	5	3	3	3	
	Max. number	2	2	2	2	3	
	Min. yield in face length	5/6	5/6	5/6	2/3	2/3	
Max. sweep and crook allowance (percent of gross volume)		15		30		50	
Max. cull and sweep allowance (percent of gross volume)		40		40		50	
*End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D1737.		1Ash and basswood butts can be 12 inches if otherwise meeting requirements for small No. 1's.					
**A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.		210-inch logs of all species can be No. 2 if otherwise meeting requirements for small No. 1's.					
		3Otherwise No. 1 logs with 51-60 percent cull can be No. 2.					
		4Otherwise No. 2 logs with 51-60 percent cull can be No. 3.					

Figure 10.--  
Grade standards  
used for  
hardwood lum-  
ber logs in  
forest survey  
of New Jersey.

# TIE AND TIMBER LOGS

GRADE FACTORS		SPECIFICATIONS
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements: not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound surface defects permitted**	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.	

\*Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

\*\*Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Figure 11.--The standards used for hardwood tie and timber logs in the forest survey of New Jersey.

# YELLOW PINE LOGS

GRADE	DIAMETER (in inches, inside bark)	LENGTH (feet)	SURFACE REQUIREMENTS
1	10-16	8+	Surface clear (not considering adventitious knots or branches).
	16+	8+	Not more than three 2- to 4-inch knots and any number of smaller knots.
2	8-9	8+	Surface clear.
	10-13	8+	Any number of small knots (less than 2 inches in diameter).
	14+	8+	Not more than six 2- to 4-inch knots and any number of smaller knots.
3	6-7	8+	Any number of small knots not exceeding 1-inch in diameter.
	8-13	8+	Not more than six 2- to 4-inch knots and any number of smaller knots.
	14+	8+	More than six 2- to 4-inch knots. Any log with one or more knots 5 inches or larger.
	Knotty or crooked merchantable logs 8 inches d.i.b. or larger and 10 feet in length or longer that do not fall in either Grade 1 or Grade 2.		

Figure 12.--The grade standards used for yellow pine logs in the forest survey of New Jersey.

## PULPWOOD SPECIFICATIONS

### *Source of Specifications*

The pulpwood specifications used in this report are those set up by the Appalachian Technical Committee of the American Pulpwood Association.

### *Pulpwood Trees*

Live trees of commercial species, 5.0 inches d.b.h. and larger, containing at least two contiguous pulpwood bolts and with 50 percent or more of the main-stem volume usable for pulpwood. (A pulpwood bolt is a section of the main stem 4 feet long; 4.0 inches or larger inside bark at the small end; free from any indication of rot, charred wood, metal, or hollow center; and contiguous to one or more other bolts that meet the same requirements. Crotches are excluded; sweep or crook in any section shall exclude the bolt if a line from center of top cut to center of bottom cut passes outside the wood at any point.)

### *Pulpwood Stands*

*0 to 5 cords per acre.*--Stands containing trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and having a net volume per acre of less than 400 cubic feet. (Includes seedling-and-sapling stands and nonstocked areas.)

*5 to 15 cords per acre.*--Stands containing trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and having a net volume per acre ranging from 400 to 1,200 cubic feet.

*15 cords or more per acre.*--Stands containing trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and having a net volume per acre of more than 1,200 cubic feet.

### *Pulpwood Volume*

Net volume in standard cords (including bark) of the main stems of pulpwood trees, from stump to point where the top breaks up into branches or to a minimum top diameter of 4.0 inches (inside bark). Deductions are made for all portions of the stem that fail to meet pulpwood bolt requirements.

## MEASURES OF TIMBER GROWTH AND CUT

*Net annual growth of sawtimber.*--The change (resulting from natural causes) in net board-foot volume of live sawtimber on commercial forest land during a specified year.

*Ingrowth of sawtimber.*--The net board-foot volume of trees that first became sawtimber trees during the inventory year as measured at the end of the year.

*Annual mortality of sawtimber.*--The net board-foot volume removed from live sawtimber on commercial forest land during a specified year through death from natural causes.

*Net annual growth of growing stock.*--The change (resulting from natural causes) in net cubic-foot volume of growing stock on commercial forest land during a specified year.

*Ingrowth of growing stock.*--The total net cubic-foot volume of trees that first become a part of growing stock during the inventory year as measured at the end of the year.

*Annual mortality of growing stock.*--The net cubic-foot volume removed from growing stock during a specified year through death from natural causes.

*Annual cut of live sawtimber.*--The net board-foot volume of live sawtimber trees cut or killed by logging, and by land-clearing and cultural operations, on commercial forest land during a specified year.

*Annual cut of growing stock.*--The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging, and by land-clearing and cultural operations, on commercial forest land during a specified year.

## FOREST SURVEY METHODS

Estimates of forest area, timber volume, and growth reported here are based upon information obtained from aerial photographs and from sample plots examined on the ground. First, photo-interpretation plots were marked off on aerial photographs. These plots were distributed uniformly by mechanical means over photographs of the entire State with the exception of completely urban areas in parts of Bergen, Essex, Union, Hudson, and Camden Counties. Each photo plot was then classified as either forest or nonforest. Forest plots were classified further according to stand-size and broad forest type.

Field crews inspected some of the photo plots on the ground. Enough plots were selected at random to attain specified levels of statistical accuracy. Species and volume data were collected on these ground plots; and the photo classification of stand size and forest type was verified or--if necessary--changed.

Average annual periodic net growth was estimated by combining measurements of radial growth and inventory data on number of trees by species and diameter class, after adjusting for cutting and mortality. Radial growth was measured on increment cores extracted from sample trees.

Estimates of timber cut in New Jersey were based on production surveys and wood-utilization studies. The production surveys carried out by the Northeastern Forest Experiment Station and the U.S. Bureau of the Census yielded estimates of the output of all timber products. From studies conducted by the Northeastern Forest Experiment Station on all types of logging operations, estimates of logging residues were developed, which, when added to the volume of timber products, gave estimates of timber cut.

### RELIABILITY OF DATA

The estimates in this report may contain two kinds of errors. First, photo-interpreters may make mistakes in classification and fieldmen may make mistakes in measuring and recording. While there is no practical way of finding out just how often such errors occur, they are kept to a minimum by closely checking all phases of the work.

The second type of error is inherent in sampling procedures, and it can be estimated. The standard errors given in the footnotes of several tables refer to sampling errors. The user of these data should remember that in every case, total figures are more reliable than subtotals, and subtotals are more reliable than any of their component figures. In general, the smaller a component figure in relation to a particular total, the larger the sampling error to which the component figure is subject.

### SPECIES TALLIED

The tree species tallied in New Jersey are listed below:

#### *Softwoods*

Pitch pine	- <i>Pinus rigida</i>
Shortleaf pine	- <i>Pinus echinata</i>
Virginia pine	- <i>Pinus virginiana</i>
Atlantic white-cedar	- <i>Chamaecyparis thyoides</i>
Hemlock (Eastern hemlock)	- <i>Tsuga canadensis</i>
White pine (Eastern white pine)	- <i>Pinus strobus</i>
Red pine	- <i>Pinus resinosa</i>
Eastern redcedar	- <i>Juniperus virginiana</i>

### *Soft Hardwoods*

Red maple	- <i>Acer rubrum</i>
Silver maple	- <i>Acer saccharinum</i>
Yellow-poplar	- <i>Liriodendron tulipifera</i>
Sweetgum	- <i>Liquidambar styraciflua</i>
Black tupelo	- <i>Nyssa sylvatica</i>
Elm	- <i>Ulmus</i> species
Gray birch	- <i>Betula populifolia</i>
American basswood	- <i>Tilia americana</i>
Bigtooth aspen	- <i>Populus grandidentata</i>
Butternut	- <i>Juglans cinerea</i>
Hackberry	- <i>Celtis occidentalis</i>
Black cherry	- <i>Prunus serotina</i>
Black willow	- <i>Salix nigra</i>
Willow, other than black	- <i>Salix</i> species
Magnolia species	- <i>Magnolia</i> species

### *Hard Hardwoods*

Black oak	- <i>Quercus velutina</i>
Northern red oak	- <i>Quercus rubra</i>
Southern red oak	- <i>Quercus falcata</i>
Scarlet oak	- <i>Quercus coccinea</i>
Pin oak	- <i>Quercus palustris</i>
White oak	- <i>Quercus alba</i>
Chestnut oak	- <i>Quercus prinus</i>
Swamp white oak	- <i>Quercus bicolor</i>
Post oak	- <i>Quercus stellata</i>
Willow oak	- <i>Quercus phellos</i>
Water oak	- <i>Quercus nigra</i>
Ash	- <i>Fraxinus</i> species
Sweet birch	- <i>Betula lenta</i>
River birch	- <i>Betula nigra</i>
Yellow birch	- <i>Betula alleghaniensis</i>
Hickory	- <i>Carya</i> species
American beech	- <i>Fagus grandifolia</i>
Sugar maple	- <i>Acer saccharum</i>
Sycamore	- <i>Platanus occidentalis</i>
Black walnut	- <i>Juglans nigra</i>
Black locust	- <i>Robinia pseudoacacia</i>
Honeylocust	- <i>Gleditsia triacanthos</i>
Flowering dogwood	- <i>Cornus florida</i>
American holly	- <i>Ilex opaca</i>

# THE MAJOR FOREST TYPES IN NEW JERSEY

1955

